GROUP 22B

AUTOMATED MANUAL TRANSMISSION

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AUTOMATED MANUAL TRANSMISSION

GENERAL INFORMATION

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Automated manual transmission is a newly introduced, fully integrated and electromechanically operated 6-speed gearbox.
As automated manual transmission is designed based on 6-speed manual gearbox and driven by electric actuators (motors) via sophisticated twin-drum shift mechanism, it gives our customers "easy to drive as A/T", "fun to drive and high fuel efficiency as M/T".

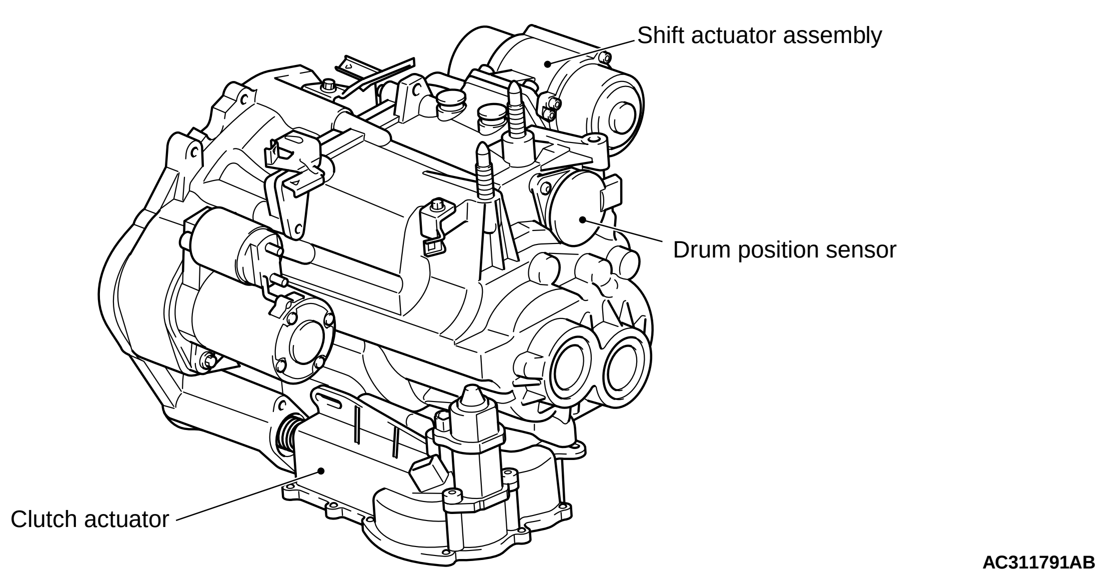
PROJECT CONCEPT

Automated manual transmission is designed so as to achieve optimal balance of high fuel efficiency and comfort (easy to drive, fast to shift), owing to new mechanism, twin-drum integrated automated manual transmission and sophisticated control logic.
It provides best in class most sophisticated driving impressions, comfort and sporty, among many of compact class cars in the world.

SPECIFICATIONS

Item		Specification
Transmission model		F6SGA-1-41
Engine model		135
Transmission type		6-speed forward, 1-speed reverse
Transmission gear ratio	1st	3.071
	2nd	1.913
	3rd	1.258
	4th	0.943
	5th	0.763
	6th	0.643
	Reverse	3.231
Final reduction ration		4.529
Transmission oil	Specified lubricants	Castrol/Burmach gear oil BOT 328 (or exact equivalents)
	Quantity L	1.75

OUTSIDE VIEW

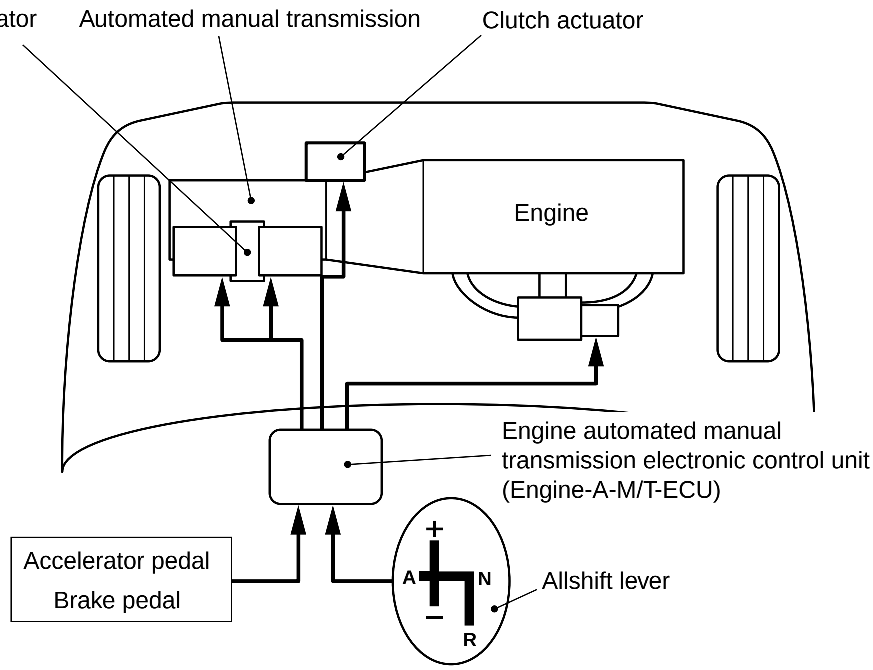


DESCRIPTION OF STRUCTURE AND OPERATION

STRUCTURE

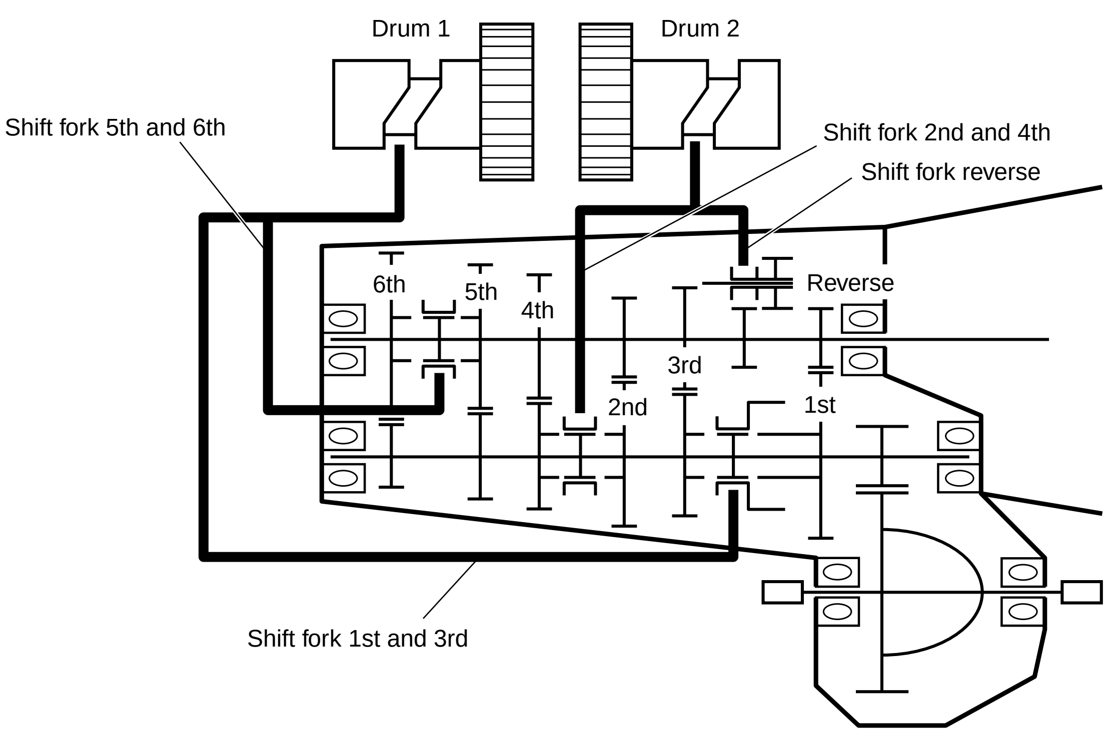
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Automated Manual Transmission System



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Automated Manual Transmission

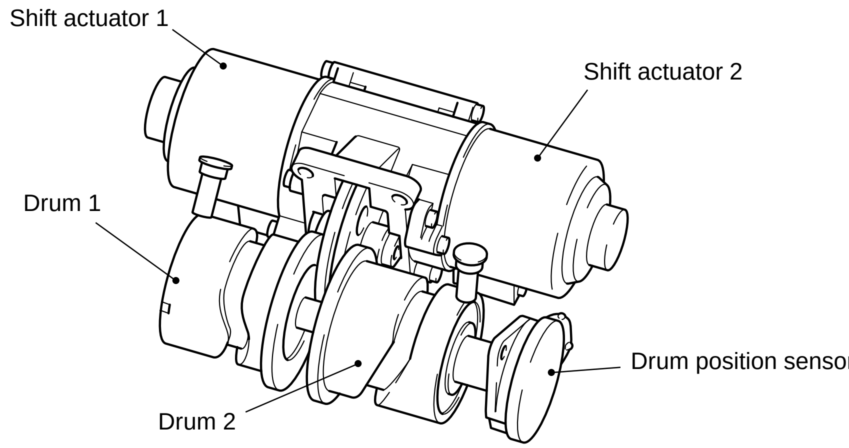


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TWIN-DRUM SHIFT SYSTEM (HART OF QUICKER SHIFT)

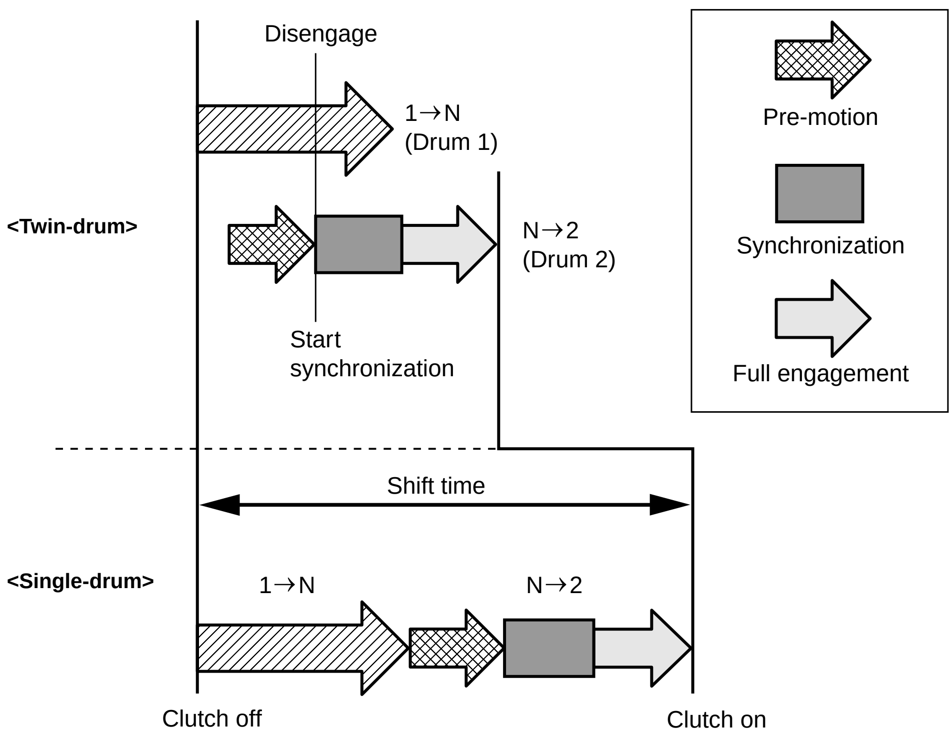
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This system, accompanied with a unique layout of speed gear sets, enables quickest shift among neighbouring gears.



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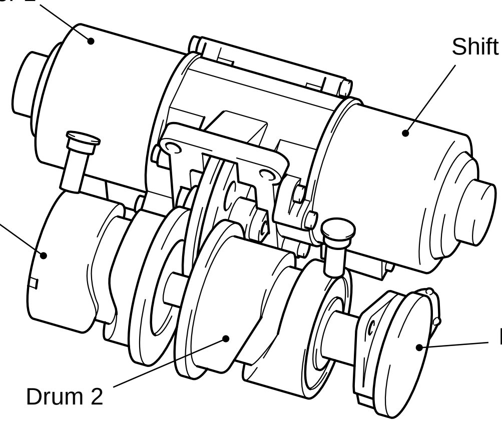
Shift time (for ex. 1st gear → 2nd gear)



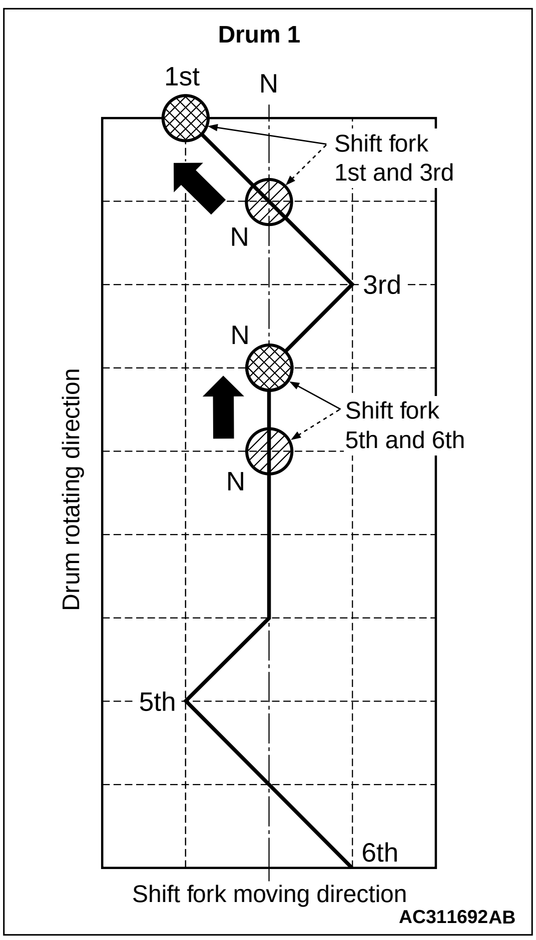
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OPERATIONS

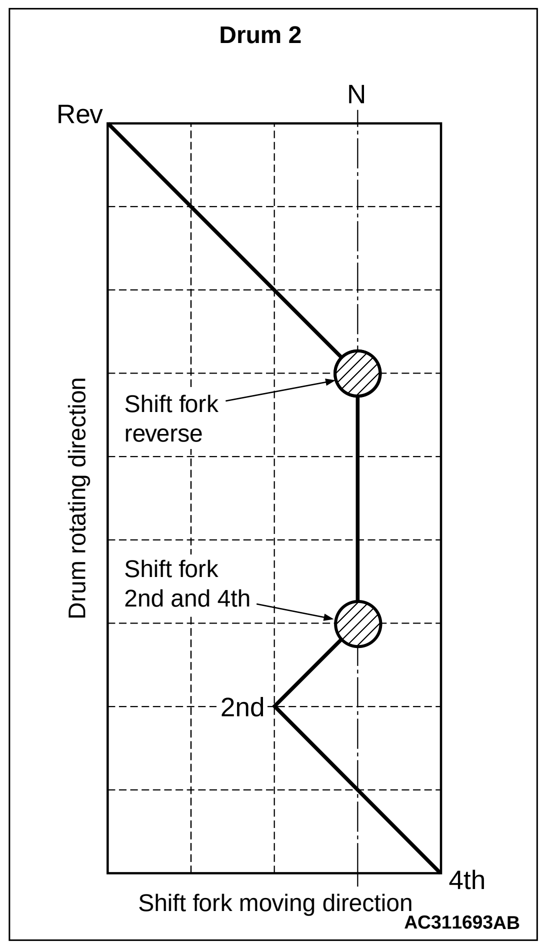
SHIFT OPERATION (N → 1ST GEAR)



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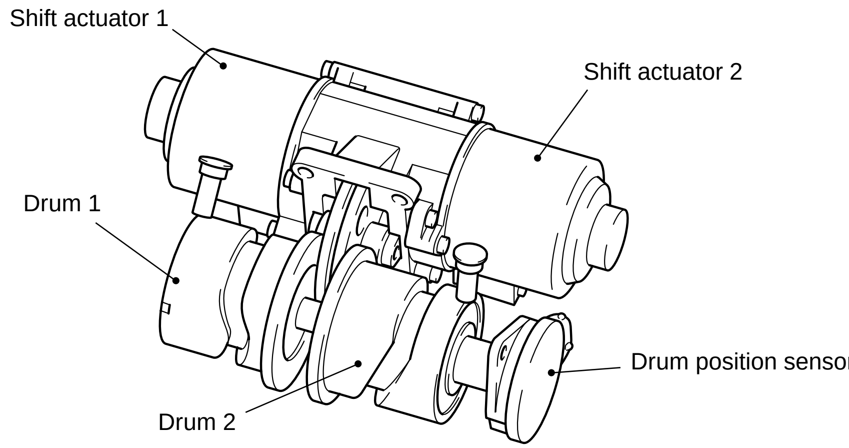
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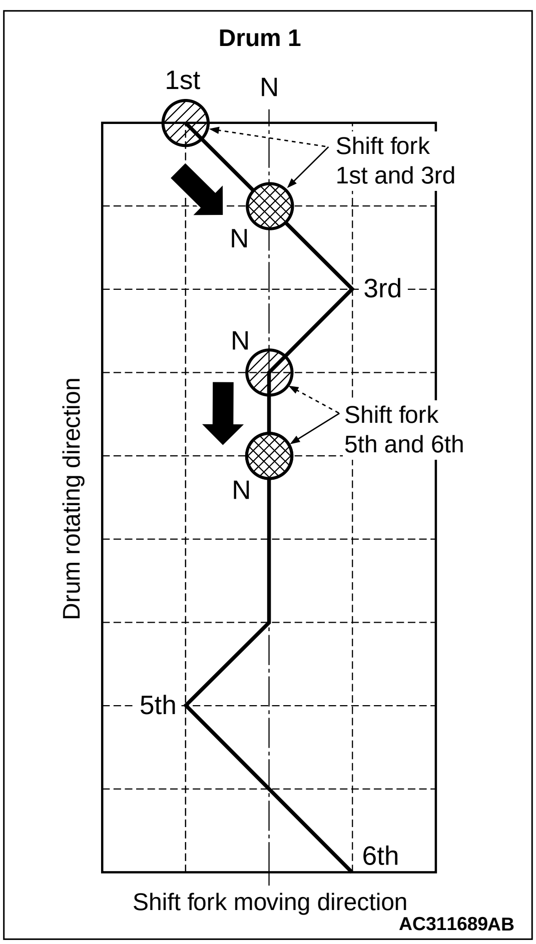
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On each drum, two forks are located in a position makes 120 degrees.
For N → 1st gear: Only drum-1 rotates.

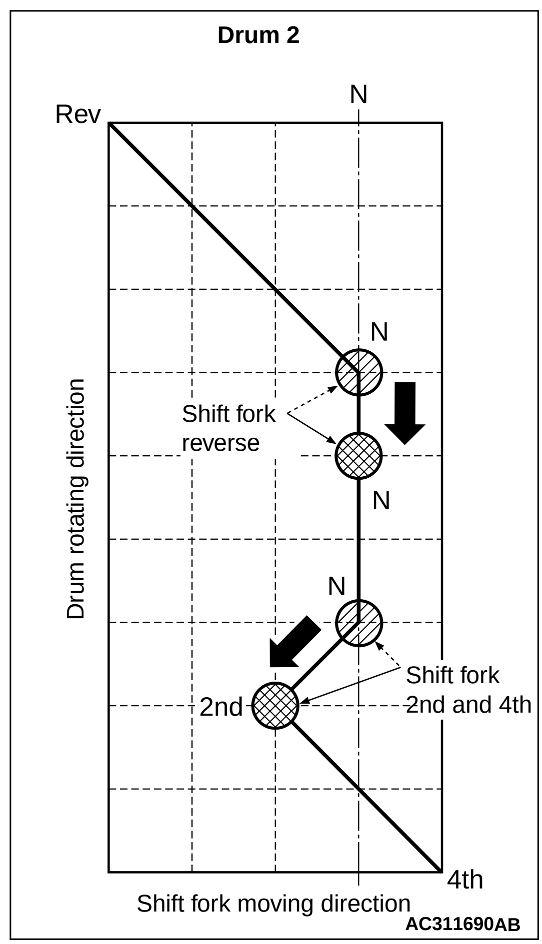
SHIFT OPERATION (1ST GEAR → 2ND GEAR)



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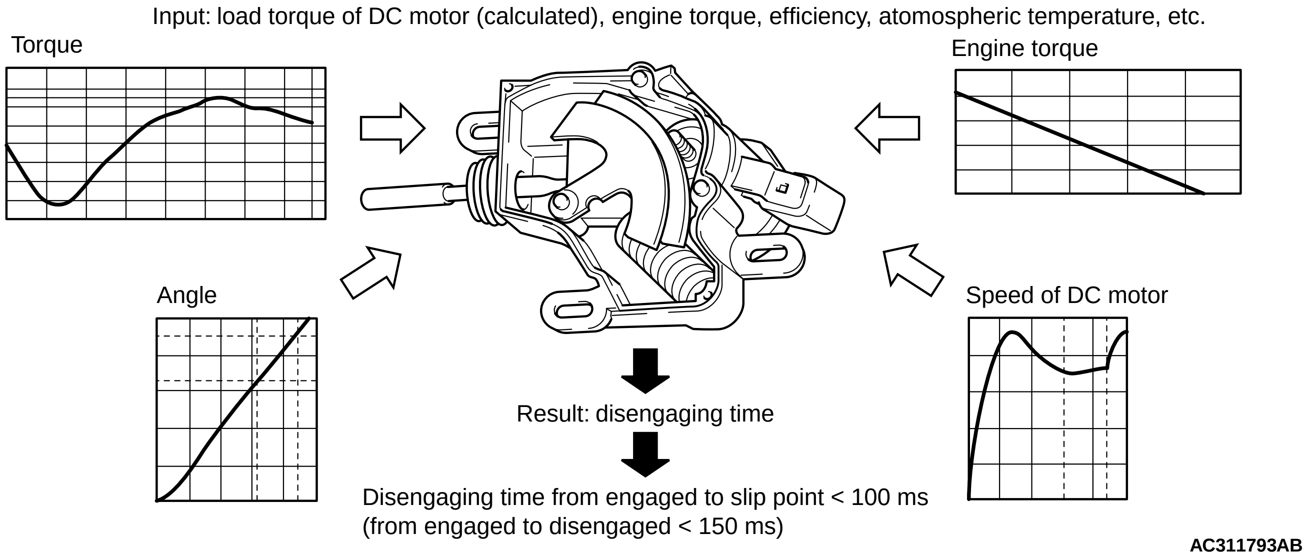
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In case of 1st gear → 2nd gear: Two drums rotate individually.
Drum-1 makes 1 to N.
Drum-2 makes N to 2.

CLUTCH ACTUATION

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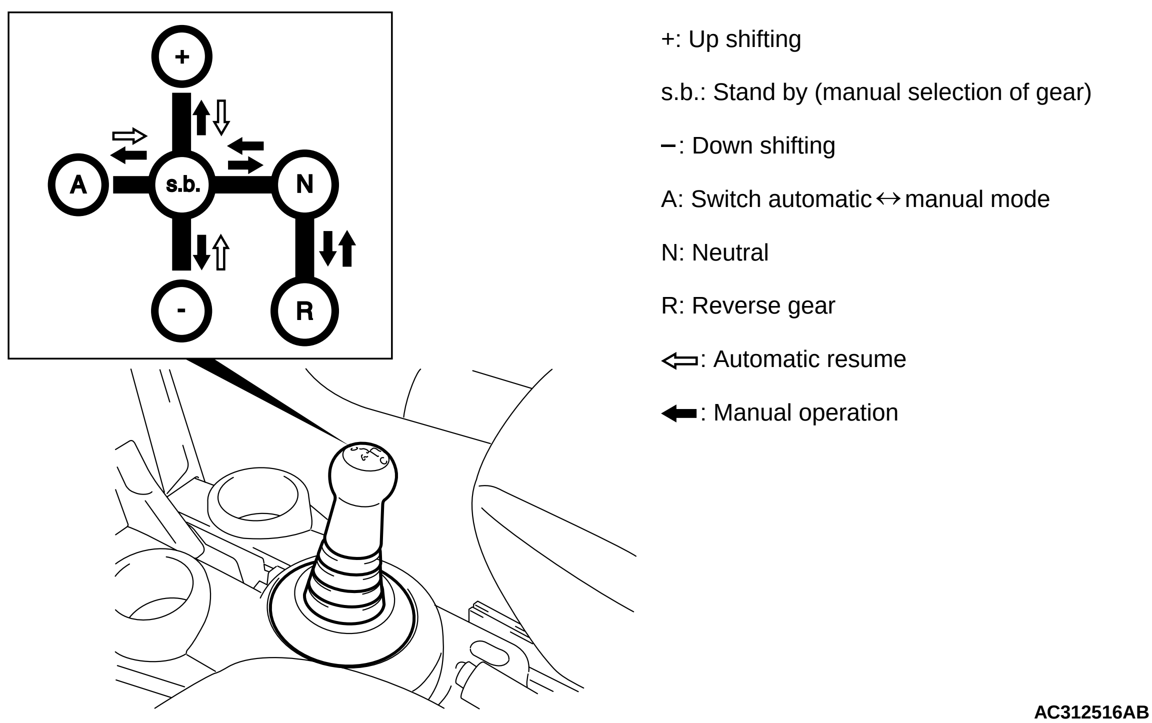
Clutch (Conventional type, dry, single plate) is activated by electromechanical actuator.



DRIVING MODE

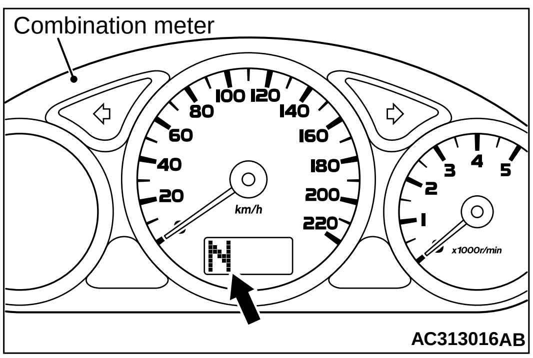
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Shifting the Allshift lever from the s.b. position to the "+" or "–" position enables a driver to upshift or downshift the gears voluntarily and quickly (manual mode). Shifting the Allshift lever from the s.b. position to "A" activates the auto mode which enables the driver to run as A/T (automatic shift control).



Position	Operation	Function	Further explanation
"N"	In "N"	Neutral	Engine start possible only at "N".
"R"	"N" → "R"	Reverse drive	No creeping.

Position	Operation	Function	Further explanation
s.b. (stand by)	"N" → s.b.	Forward drive	Creeping starts (with brake pedal depress).
		Auto mode or Manual mode	Starts from auto mode. <135950>
			Starts from manual mode. <135930>
"A"	s.b. → "A" (tip)	Mode change	Auto mode or Manual mode comes alternatively. (Auto mode → Manual mode → Auto mode → Manual mode)
"+", "–"	s.b. → "+" (tip) s.b. → "–" (tip)	+: Manual up shifting	Lower gear will be selected. *1, *2
		–: Manual down shifting	Higher gear will be selected. *1, *3
		*1: After "+" or "–" tip action, mode becomes manual mode. *2: If vehicle speed is too low, some up shifts neglected. *3: If engine speed is too high, down shifting neglected.	



Allshift lever position or gear position is displayed on the combination meter (arrow).

Display	Display explanation
N	Allshift lever is in "N".
R	Allshift lever is in "R".
A	Auto mode is applied as a driving mode
1, 2, 3, 4, 5, 6	Indicates the gear position. (Manual mode)
0	Driving prohibited. Allshift lever is shifted from "N" to "R" or the s.b. position before depressing the brake pedal (Driving prohibition is executed in this case, but it can be cancelled as follows: Shift the Allshift lever back to "N", depress the brake pedal, and then shift it to "R" or the s.b.position).
↑	Informs the driver of upshift operation due to the increase of the vehicle speed. (Manual mode)
↓	Downshifts automatically due to the decrease of the vehicle speed. (Manual mode)

ELECTRONIC CONTROL SYSTEM

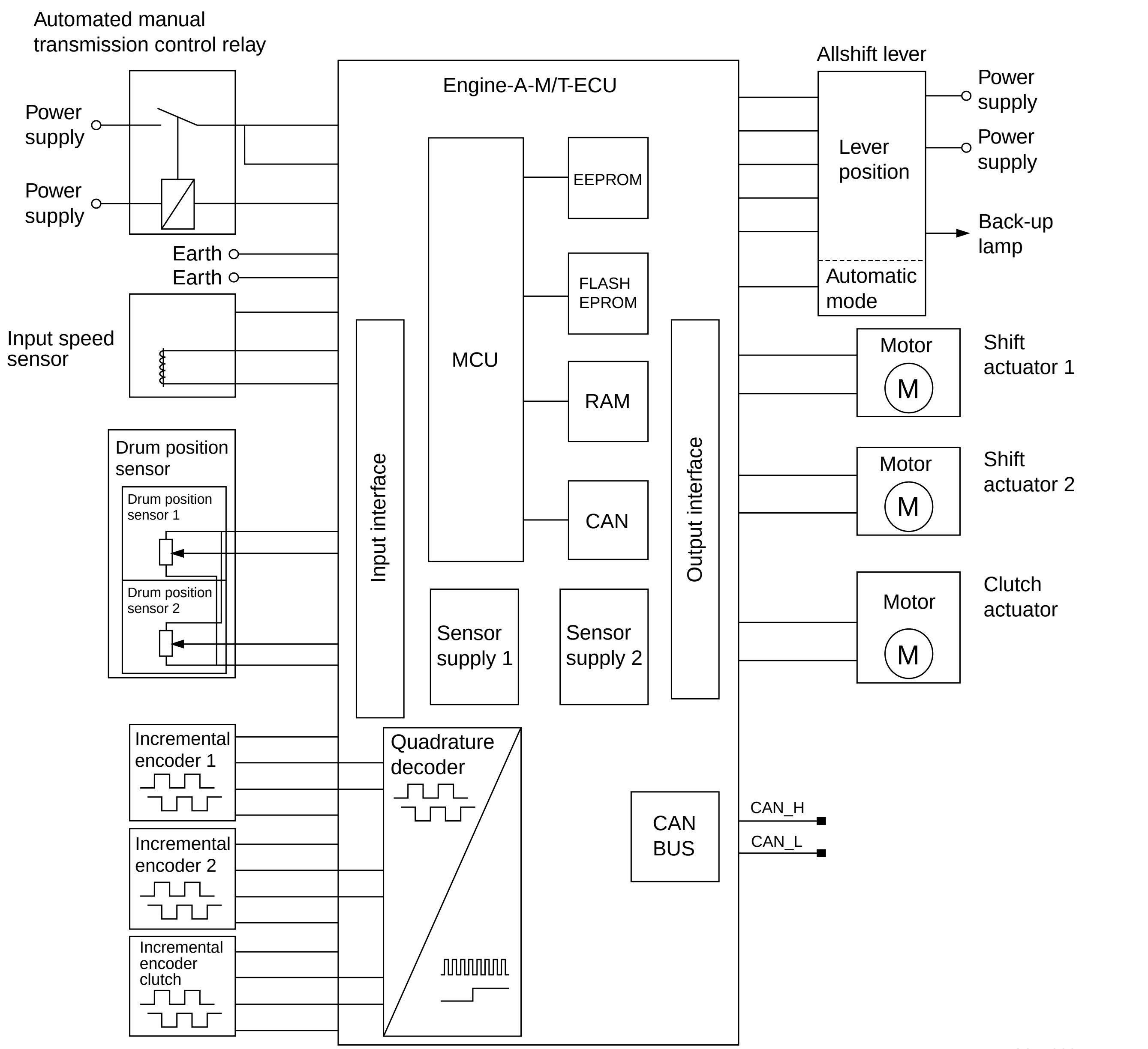
ENGINE-A-M/T-ECU

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SOFTWARE AND MANAGEMENT

Automated manual transmission management is controlled by engine-A-M/T-ECU.

The engine-A-M/T-ECU controls also engine torque and revolution as well as clutch operation and gear shift, to assure good drivability as well as comfort gear shift and lower fuel consumption.



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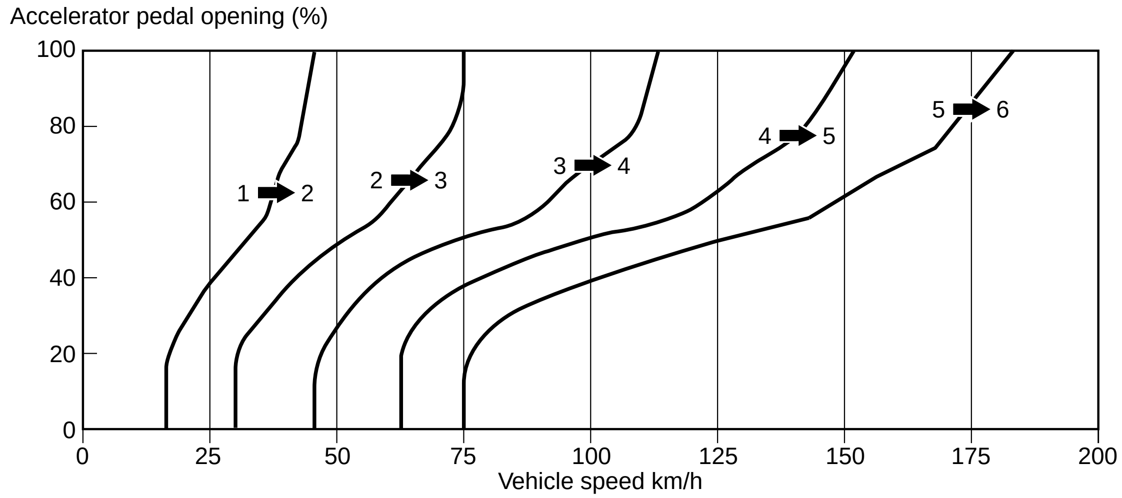
AUTOMATIC MODE

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Automatic mode gives us automatic up-shift and down-shift like conventional A/T.

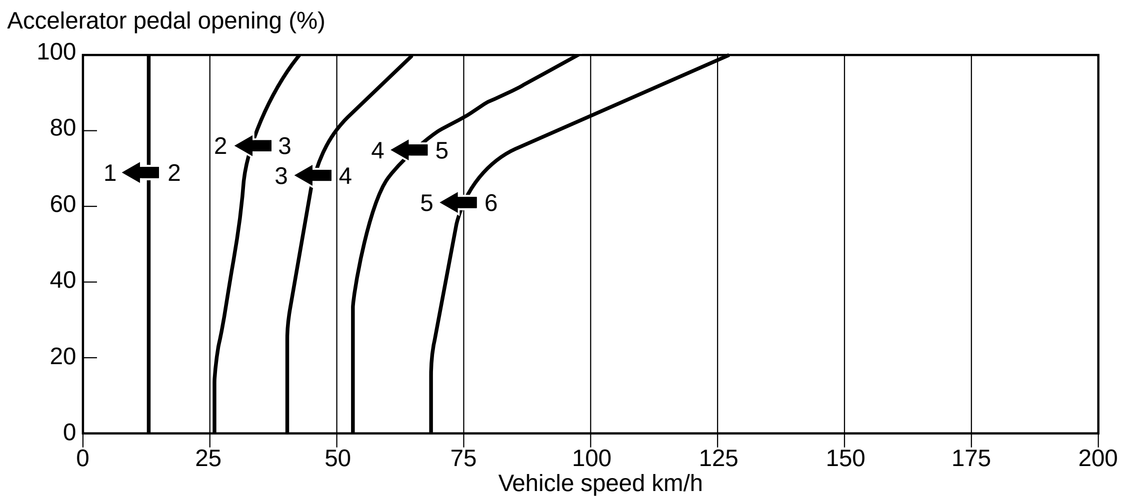
The shifting change point (speed) depends on position of accelerator pedal and vehicle speed.

<Up shift>



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<Down shift>



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OTHER FUNCTIONS

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To enable our customers comfort and safe during driving, several functions are provided.

Category	Function	Availability		Remark
		Manual-mode	Auto-mode	
Safety	Prevention of push out when engine started	×	×	Gear position "N" is necessary
	Prevention of engine over revolution (down-shift inhibition)		×	Buzzer sounds for warning
	Inhibition of clutch over heat		×	• Too often shifts are inhibited • Buzzer sounds for warning
Comfort	Start car slowly, no backward on the hill (Creeping function like A/T)	×	×	Capable after engine start with brake pedal pressed
	Prevention of engine stall at low speed		×	Up-shifts inhibition and clutch automatic open